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FUJITSU

MCU-AN-510001-E-10

FM3

32-BIT MICROCONTROLLER

MB9B500 Series

FM3 EASY KIT USER MANUAL

APPLICATION NOTE

For more information for the FM3 microcontroller, visit the web site at:
http://www.fujitsu.com/global/services/microelectronics/product/micom/roadmap/industrial/fm3/

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Revision History

Date	Revision	Change of Records
2010-12-29	V1.0	First version

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1 Overview of the FSSDC-9B506-EK Easy Kit

1.1 Features

The FSSDC-9B506-EK Easy Kit has following features:

- Simple setup: power supply, emulation and development can be implemented with one single USB wire;
- Convenient platform for learning and development: The board has extended I/O pins and peripheral pins;
- Mono LCD module, including 128*64 pixels;
- Based on the FM3 chip, equipped with multiple peripheral functions (Flash, SRAM, Timers, ADCs, USB, CAN, UART, SIO, I2C, LIN, etc.);
- User LED——demonstration of PWM driving function is available;
- System reset button;
- Potentiometer——using ADC to detect voltage;
- Joystick——used to browse display screen;
- Support a range of debugging options;
- Integrated In-circuit Debugger (**MLink**);
- Standard ARM® 20-pin JTAG debug connector;
- External emulator(Only SWD mode);
- Serial Writer Mode is available;
- Fully compatible with the IAR Embedded Workbench (Version 6.0 or above) developing environment.

1.2 FSSDC-9B506-EK Product Specifications

- Power supply: The user can select power supply for FSSDC-9B506-EK from the two power supply methods below.

  MLink USB (Type-B) connector (the other end connecting to the PC)

  MB9BF500 USB (Type-B) connector (the other end connecting to the PC)

- Size of the easy kit (including the extended part of USB socket)

  – 67.3mm x 120.5mm x 1.6mm

- Reference voltage for analog sampling: AVcc = Vcc。

Note: make sure to connect the ground of the two power supplies before connecting the emulator to the target board if they are provided by two different power supplies.

2 FSSDC-9B506-EK Easy Kit Hardware Introduction

2.1 FSSDC-9B506-EK Easy Kit Hardware

FSSDC-9B506-EK is an easy kit, designed with simplified peripherals for studying MB9BF500 features.

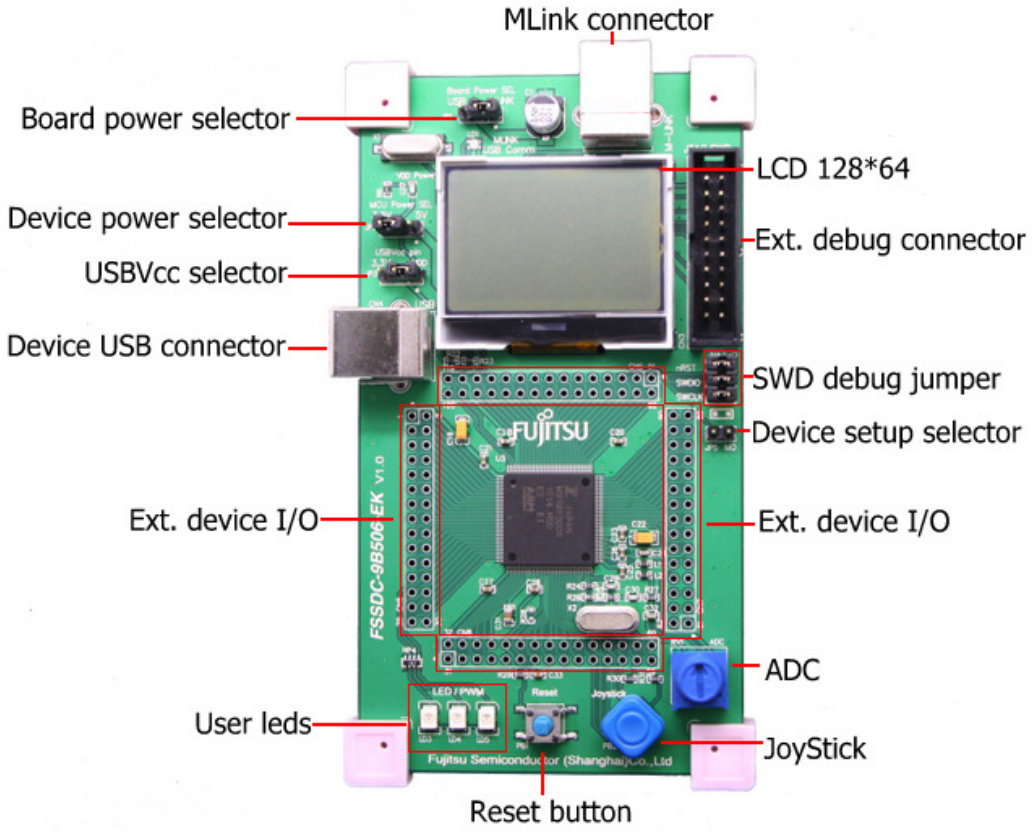

Figure 2-1

2.2 Power Supply Select

The FSSDC-9B506-EK includes three power supply options: on-board power supply, target chip power supply, target chip USB external power supply.

On-board Power Supply

The user can provide easy kit with power through two methods, as indicated in Figure 2-1.

- Connecting the MLink connector (CN1), and setting the Board Power SEL Jumper (JP1) to MLink connection;
- Connecting the Device USB connector (CN4), and setting the Board Power SEL Jumper (JP1) to USB connection.

Target Chip Power Supply

3.3V or 5V is supported.

Target Chip USB External Power Supply (USBVcc)

Set the USB Vcc jumper (JP3) to 3.3V. Please be noted not to set USB Vcc jumper (JP3) to VDD for MB9BF500.

2.3 Boot mode

A setting jumper (JP5) is prepared on the easy kit for boot mode. The default setting (set JP5 open) makes the chip boots from the user program area (on-chip FLASH). The chip will boot from boot code area when it is set to Serial Writer Mode. Users can download the code to the chip using the corresponding I/O.

2.4 Emulation Mode

On-board MLink(debugging MB9BF500 on-board)

MLink performs debugging on-board system with SWD mode. Users don't have to do anything except confirming connection of the SWD debug jumper (JP4).

On-board MLink(debugging user target system)

MLink can connect to the user target system through the standard ARM® 20-pin JTAG socket. On-board MLink supports JTAG and SWD mode. When use on-board MLink to debug user target system, make sure SWD debug jumper (JP4) open.

External emulator (debugging MB9BF500 on-board)

MLink can connect to the user target system through the standard ARM® 20-pin JTAG socket (CN3), thereby allowing the external emulator to emulate the FSSDC-9B506-EK **(only SWD mode is available).**

1. First switch off power supply of the easy kit, then connect the external emulator to CN3 of the study board.
2. Make sure JP4 were shorted well.
3. Set jumper JP1 to the USB power supply mode and provide power to the easy kit via the USB connector CN4.
4. Select the corresponding external emulator in the emulation developing environment.
5. Start debug.

2.5 On-board Peripherals

- **ADC**

  A potentiometer (RV1) is provided on the easy kit, used to demonstrate AD conversion.

- **Joystick**

  The Joystick (PB2) on the board, which is connected directly to the GPIO on the chip, is used to browse menus and other human-machine interface.

- **System Reset (Reset Button)**

  Reset button (PB1) is used to reset the system.

- **Multiple Function LED (LEDs)**

  Three LEDs (LD3~LD5) are used to demonstrate the PWM driving function of the chip. The dimmer of LEDs be controlled after powered-on.

- **Chip Extension Pin (Ext. device I/O)**

  The easy kit also takes into consideration of user's self-development interests and requirements, by opening all GPIO and special peripheral functions of the target chip. Users can connect their self-defined module to the extended pins; therefore know more about the FM3 chip.

  Note: When using the extended ports, the user should take care of the chip to prevent the study board being damaged, which means all I/O are extended.

3 Quick Use of Embedded Emulator MLink

3.1 Description of Emulator MLink

The FSSDC-9B506-EK can be used as a stand-alone emulator. Besides, a JTAG/SWD socket of IDC-20 is reserved for the external connection of user's target device (target system which uses the FM3 chip).

Since MLink can not emulate multiple chips at the same time, the SWD emulation jumpers (JP4) must be open when the user uses the FSSDC-9B506-EK to emulate other target system.

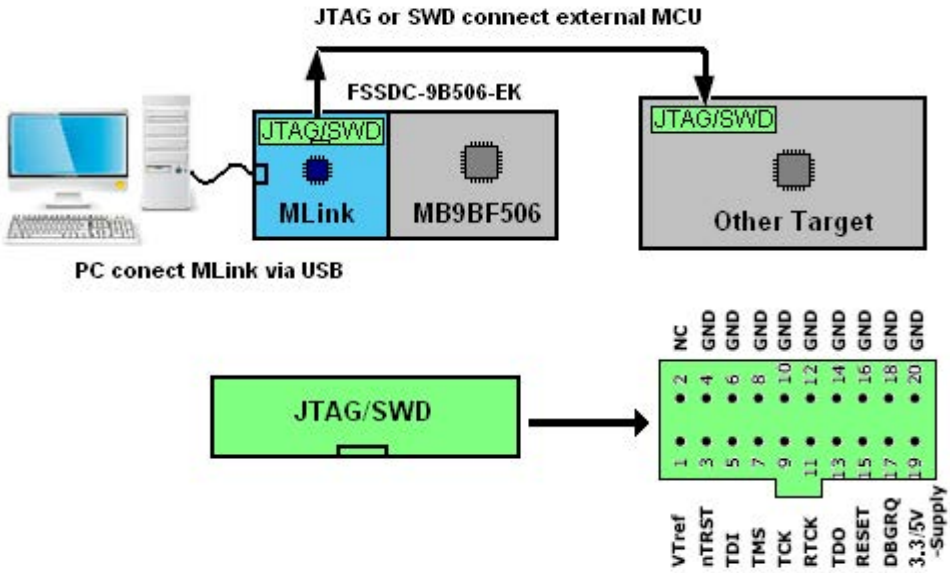
JTAG or SWD connect external MCU
FSSDC-9B506-EK
JTAG/SWD
MLink
MB9BF506
JTAG/SWD
Other Target
PC conect MLink via USB
JTAG/SWD
NC GND GND GND GND GND GND GND GND GND
2 4 6 8 10 12 14 16 18 20
1 3 5 7 9 11 13 15 17 19
VTref nTRST TDI TMS TCK RTCK TDO RESET DBGRQ 3.3/5V -Supply

Figure 3-1

Before using MLink, the MLink driver and the Manley USB driver should be installed.

3.2 How to Install the Driver for Manley MLink

Open the disc or visit http://www.manley.com.cn to download the setup_MLINK.exe installation file.

Double-click **setup_MLINK.exe file to install**, select a language and click **OK**,

Figure 3-2

Click **Next**,

Setup - MLINK
Welcome to the MLINK Setup Wizard
This will install MLINK on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Figure 3-3

Select an installation path and click **Next** to continue installation,

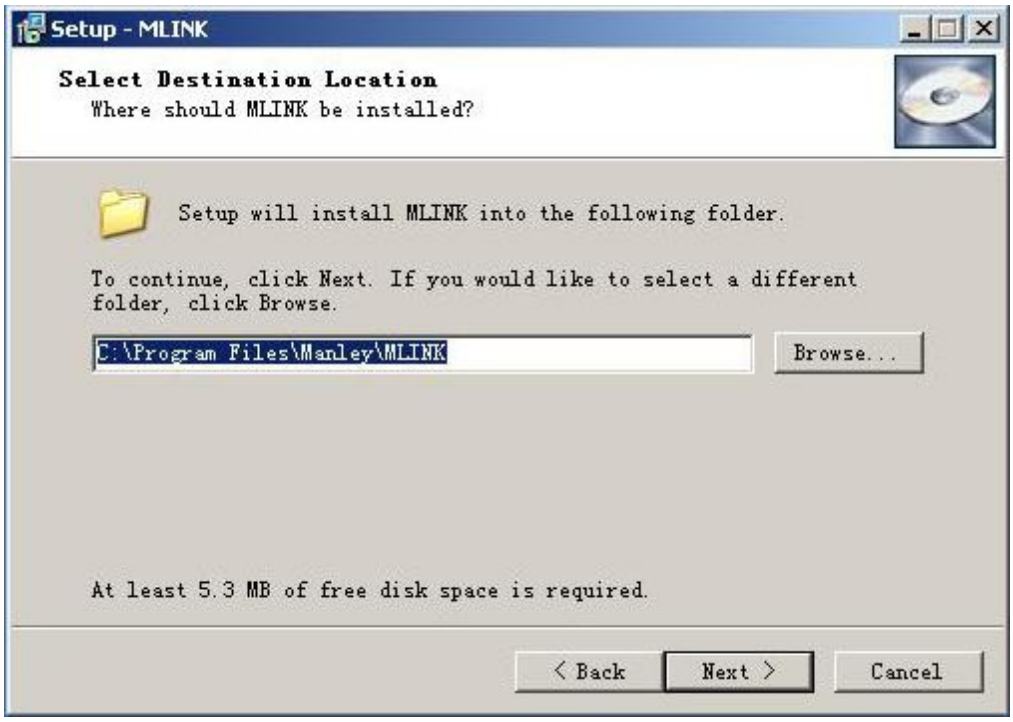
Setup - MLINK
Select Destination Location
Where should MLINK be installed?
Setup will install MLINK into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\Manley\MLINK
Browse...
At least 5.3 MB of free disk space is required.
< Back
Next >
Cancel

Figure 3-4

Select whether to create a desktop icon or not,

Setup - MLINK
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing MLINK, then click Next.
Additional icons:
Create a desktop icon
< Back
Next >
Cancel

Figure 3-5

Click **Install,**

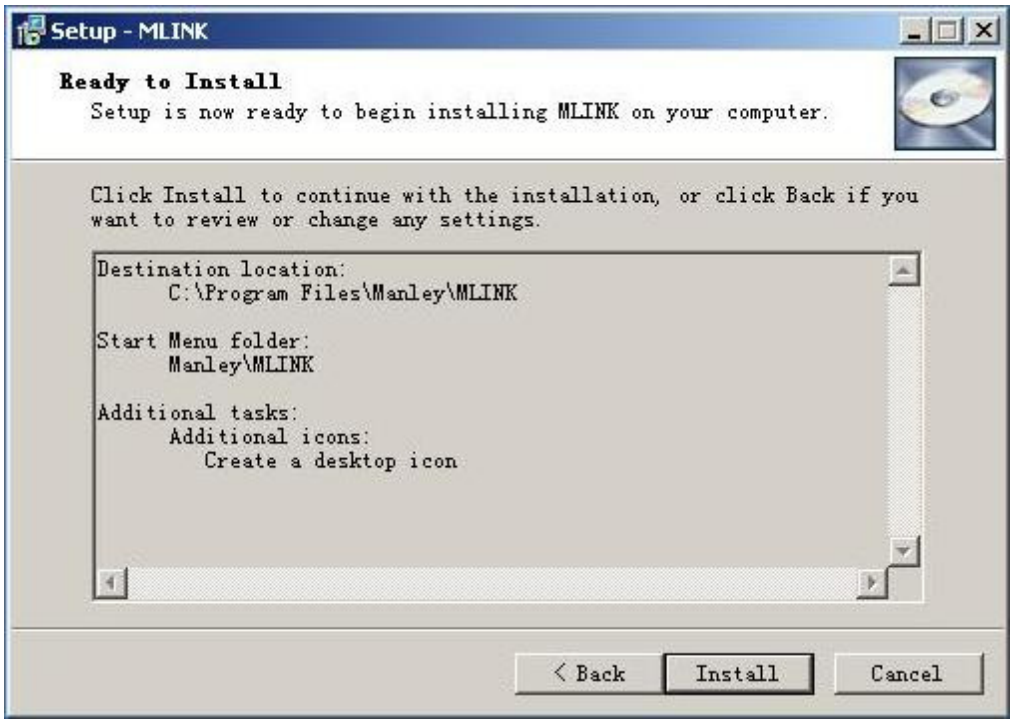
Setup - MLINK
Ready to Install
Setup is now ready to begin installing MLINK on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Destination location:
C:\Program Files\Manley\MLINK
Start Menu folder:
Manley\MLINK
Additional tasks:
Additional icons:
Create a desktop icon
< Back
Install
Cancel

Figure 3-6

Click **Finish** to complete installation.

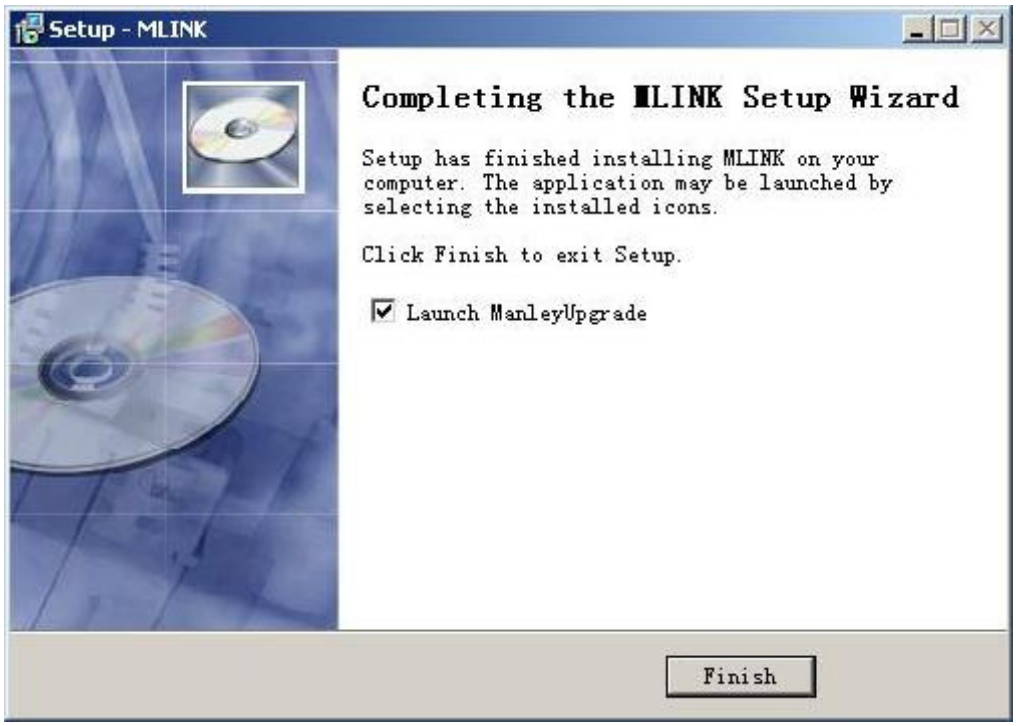
Setup - MLINK
Completing the MLINK Setup Wizard
Setup has finished installing MLINK on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Launch ManleyUpgrade
Finish

Figure 3-7

3.3 How to Install the Manley USB Driver

When the dialog window shown below pops up, select **Install from a list or specific location (Advanced)** and click **Next**,

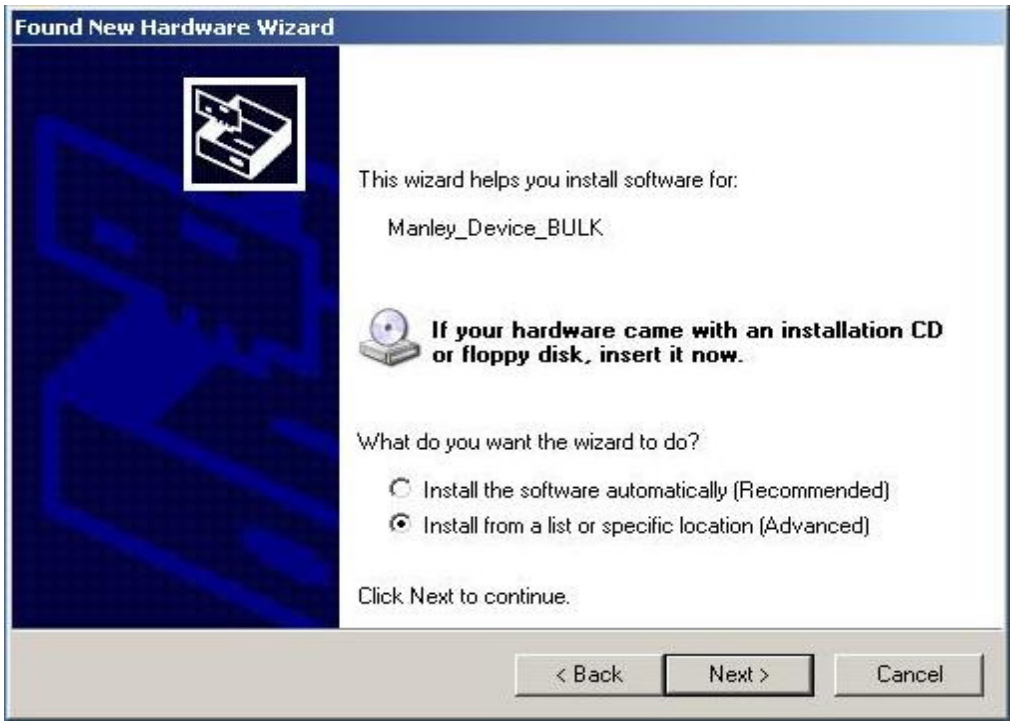
Found New Hardware Wizard
This wizard helps you install software for:
Manley_Device_BULK
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

Figure 3-8

Select the installation directory of MLink driver as shown below and click **OK**,

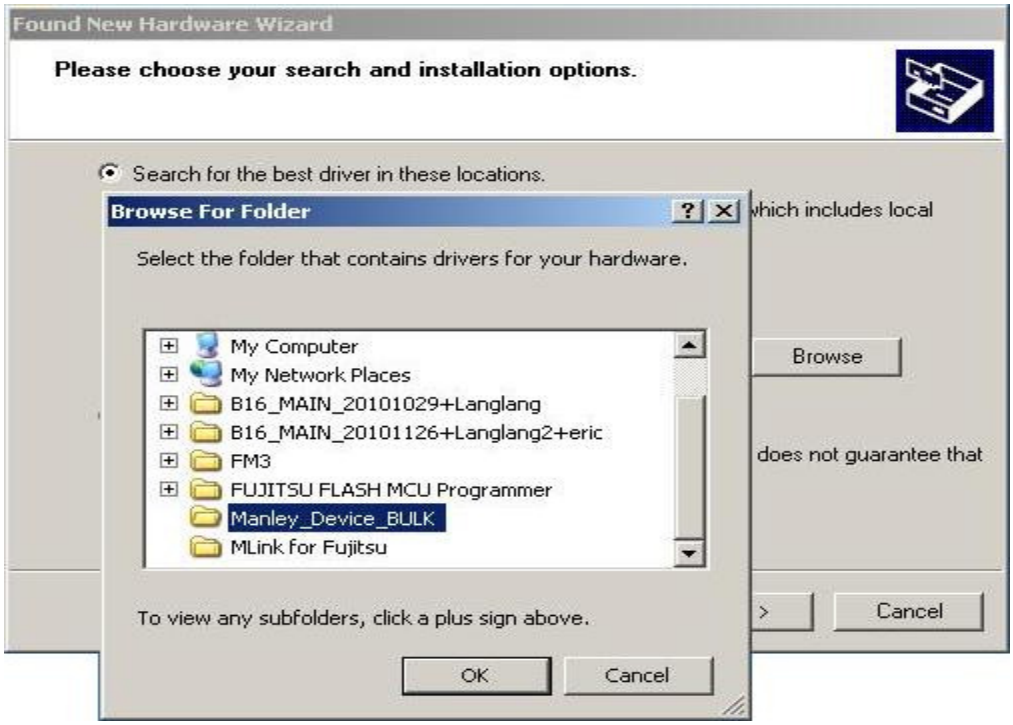

Figure 3-9

If the driver is correctly installed, the window shown below pops up,

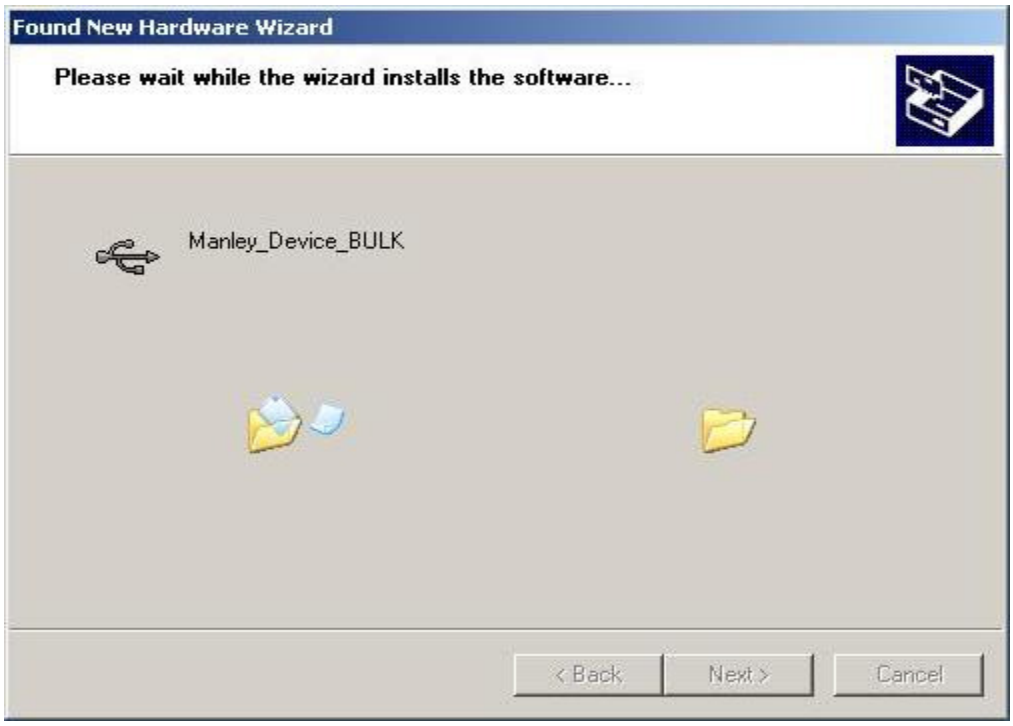

Figure 3-10

Click **Finish** to complete installation of MLink USB driver,

Figure 3-11

USB device is ready to use.

Figure 3-12

4 How to Install IAR (on-line register license is required)

Use the **IAR6.10** installation file in the disc. After the display shown below pops up, select **Install IAR Embedded Workbench**,

Figure 4-1

After entering **Install IAR Embedded Workbench**，select **Get a license【required before installation】**,

Welcome to IAR Systems
Japanese
IAR Embedded Workbench(R) Installation
You must have a license number and an installation key in order to install this Kickstart edition of IAR Embedded Workbench.
Please follow these steps:
1. Click on the Get a license link below to get a license from the IAR website.
2. You will receive an e-mail with your license number and installation key within a few minutes.
3. Click on the Install IAR Embedded Workbench(R) link below to start the installation.
Get a license (required before installation)
Install IAR Embedded Workbench®
Back
IAR SYSTEMS
www.iar.com

Figure 4-2

Please fill in the registration form. You will get a confirmation mail from IAR in your registered mail box and get a **License**,

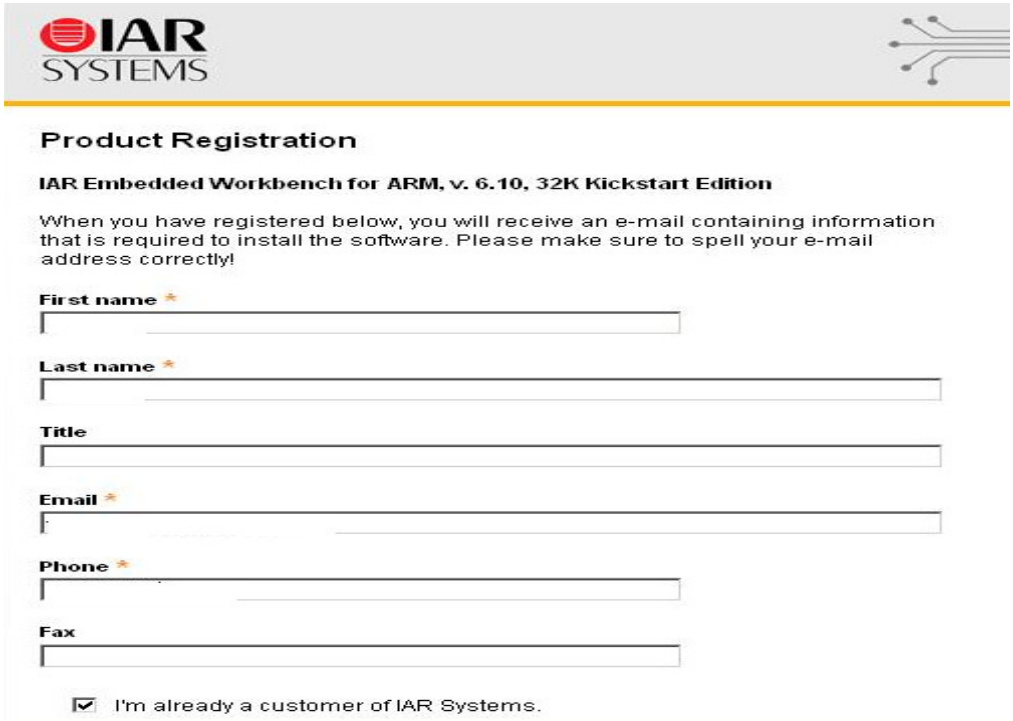
IAR SYSTEMS
Product Registration
IAR Embedded Workbench for ARM, v. 6.10, 32K Kickstart Edition
When you have registered below, you will receive an e-mail containing information that is required to install the software. Please make sure to spell your e-mail address correctly!
First name *
Last name *
Title
Email *
Phone *
Fax
I'm already a customer of IAR Systems.

Figure 4-3

After obtaining the **License,** please return to the original installation window and select **Install IAR Embedded Workbench**,

Welcome to IAR Systems
Japanese
IAR Embedded Workbench(R) Installation
You must have a license number and an installation key in order to install this Kickstart edition of IAR Embedded Workbench.
Please follow these steps:
1. Click on the Get a license link below to get a license from the IAR website.
2. You will receive an e-mail with your license number and installation key within a few minutes.
3. Click on the Install IAR Embedded Workbench(R) link below to start the installation.
Get a license (required before installation)
Install IAR Embedded Workbench
Back
IAR SYSTEMS
www.iar.com

Figure 4-4

Select **Next**.

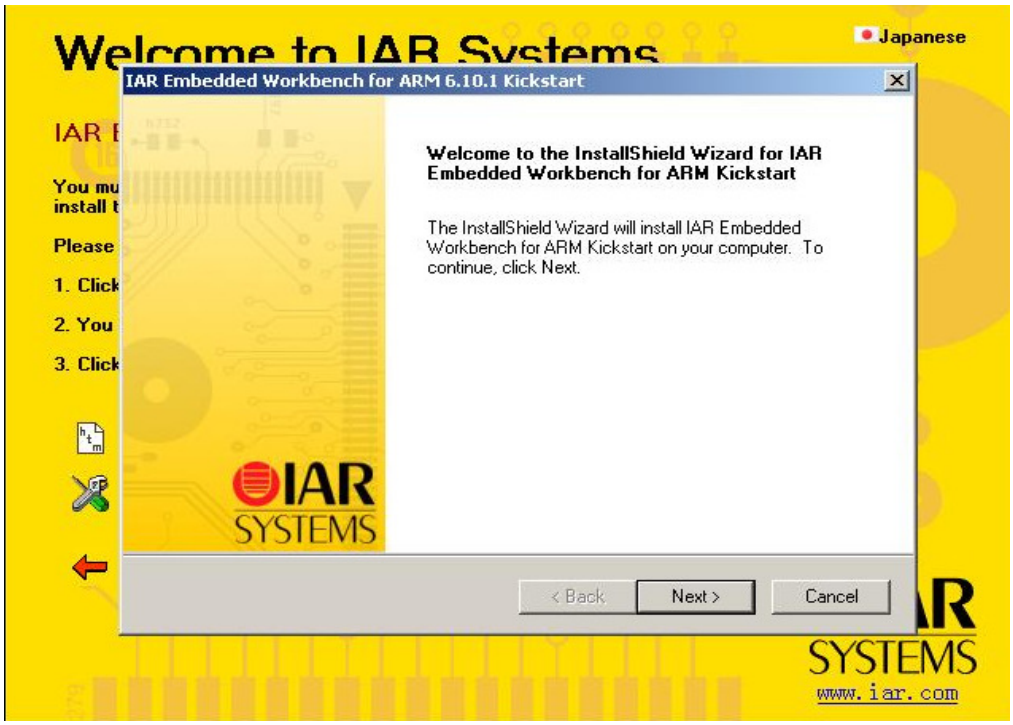
Welcome to IAR Systems
Japanese
IAR Embedded Workbench for ARM 6.10.1 Kickstart
Welcome to the InstallShield Wizard for IAR Embedded Workbench for ARM Kickstart
The InstallShield Wizard will install IAR Embedded Workbench for ARM Kickstart on your computer. To continue, click Next.
< Back
Next >
Cancel
IAR SYSTEMS
www.iar.com

Figure 4-5

Select **I accept the terms of the license agreement**,

Welcome to IAR Systems
Japanese
IAR Embedded Workbench for ARM 6.10.1 Kickstart
License Agreement
Please read the following license agreement carefully.
IAR SYSTEMS
SOFTWARE LICENSE AGREEMENT
(concerning Products: IAR Embedded Workbench? visualSTATE?and IAR PowerPac? from IAR Systems AB
PREAMBLE
THIS SOFTWARE LICENSE AGREEMENT (THE "AGREEMENT") APPLIES TO PRODUCTS LICENSED BY IAR SYSTEMS AB INCLUDING ANY OF ITS SUBSIDIARIES ("IAR SYSTEMS") OR DISTRIBUTORS ("IAR DISTRIBUTORS"), TO YOU ("THE LICENSEE").
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel
www.iar.com

Figure 4-6

Fill in **Name**，**Company** and **License**，and select **Next.**

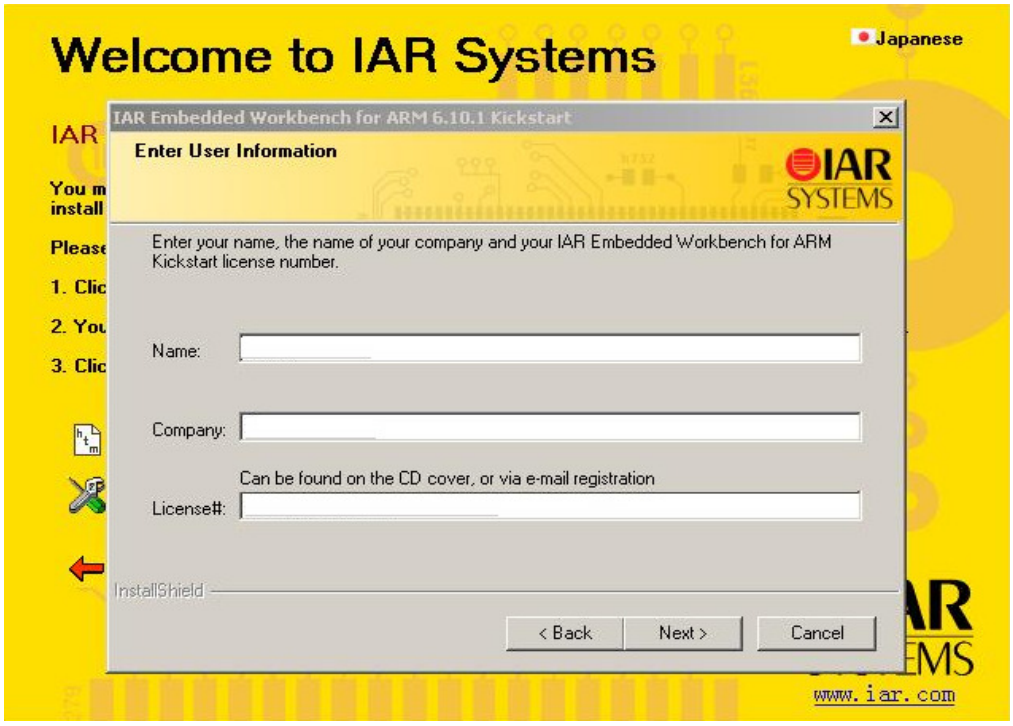
Welcome to IAR Systems
Japanese
IAR Embedded Workbench for ARM 6.10.1 Kickstart
Enter User Information
IAR SYSTEMS
Enter your name, the name of your company and your IAR Embedded Workbench for ARM Kickstart license number.
Name:
Company:
Can be found on the CD cover, or via e-mail registration
License#:
InstallShield
< Back
Next >
Cancel
www.iar.com

Figure 4-7

The **IAR** installation path selection is shown and click **Next**,

Figure 4-8

Click **Finish** to complete installation,

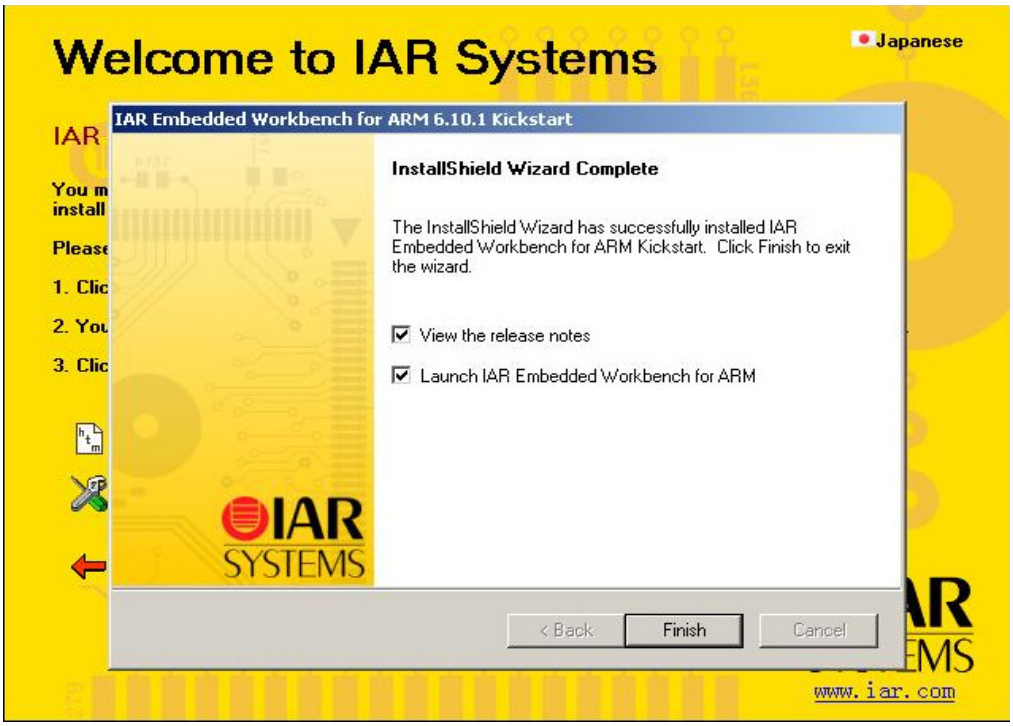

Figure 4-9

Note: The **IAR Work Bench** here is a 32K code limited version. Please purchase from IAR the **License** for version without limitation.

5 How to Debug the Sample Code

Open **MB9B500_Easy_Kit_Demo.eww** under the directory of **MB9B500_Easy_Kit_Demo-v10** in the disc and the window shown below pops up. Select **Flash Debug** or **RAM Debug,**

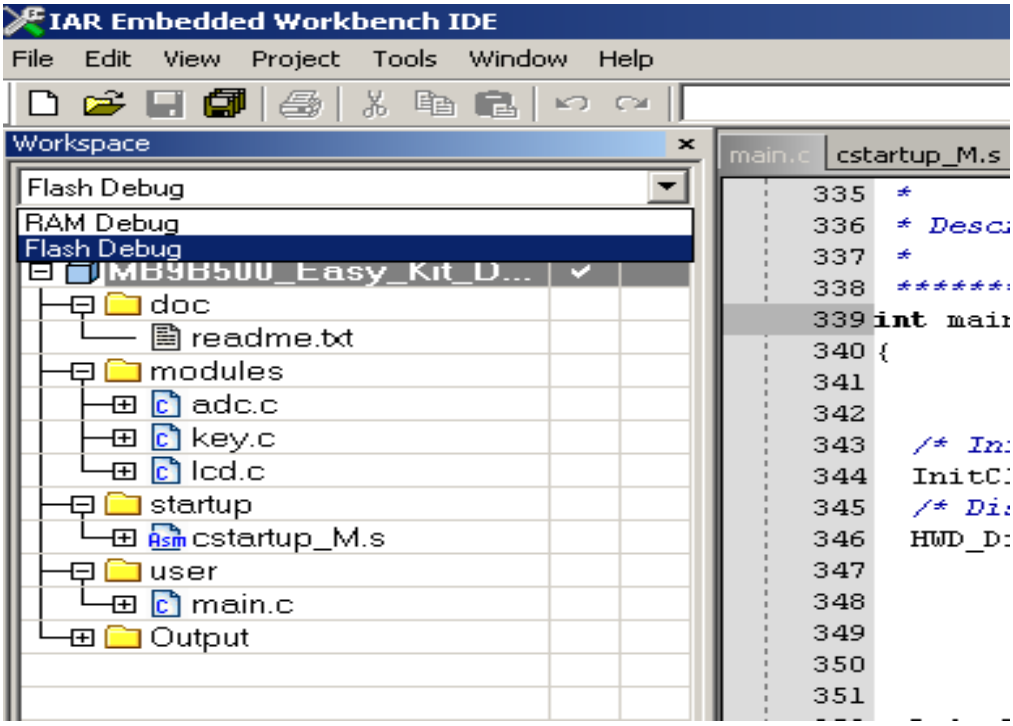

Figure 5-1

Right-click project name **MB9B500_Easy_Kit_Demo** and select **Option**,

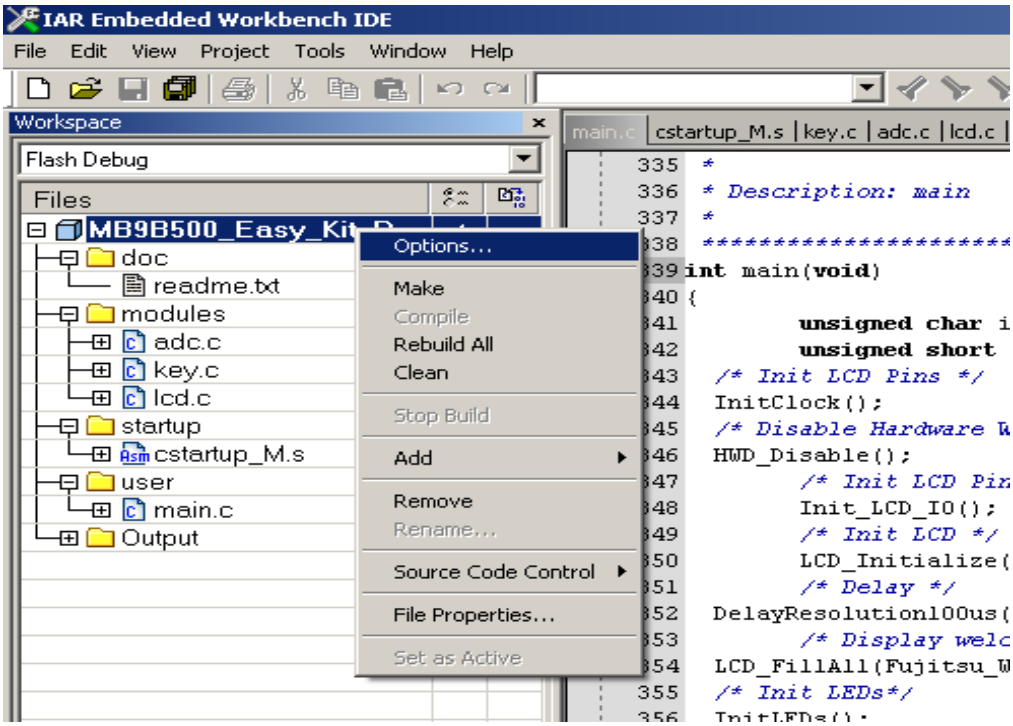

Figure 5-2

Please set **Setup→Driver** in the **Debugger** option to **Third-Party Driver**,

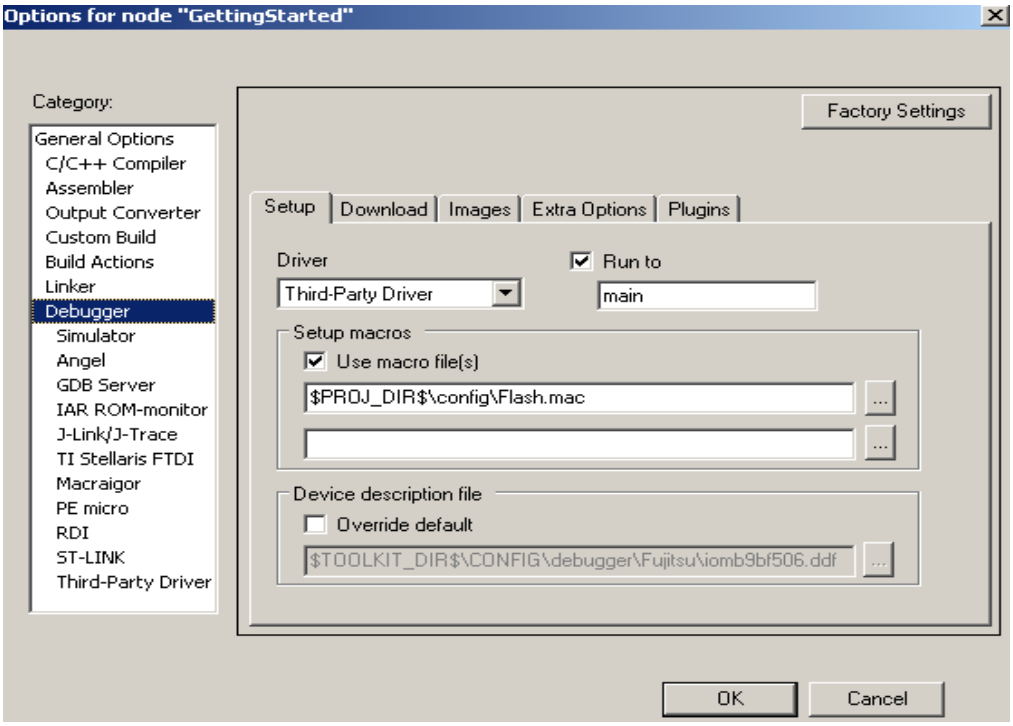

Figure 5-3

Set driver in the **Third-Party Driver** option to corresponding **Mlink** driver, browse the **Mlink** driver installed before, and select the driver **IAR_Mlink610.dll** corresponding to **IAR6.10**,

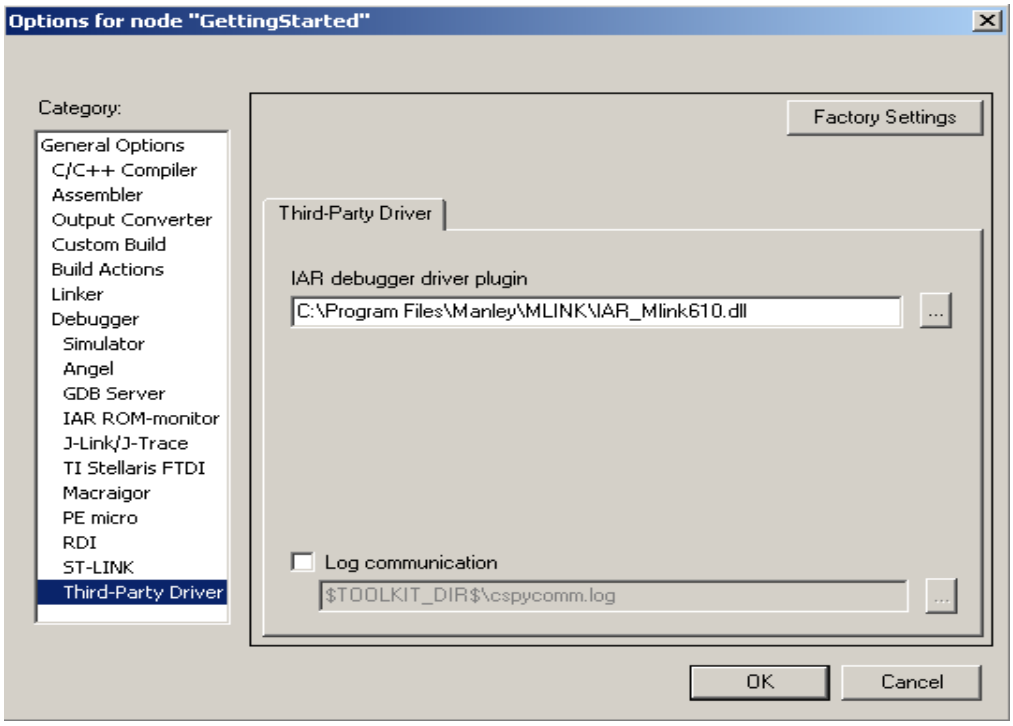

Figure 5-4-a

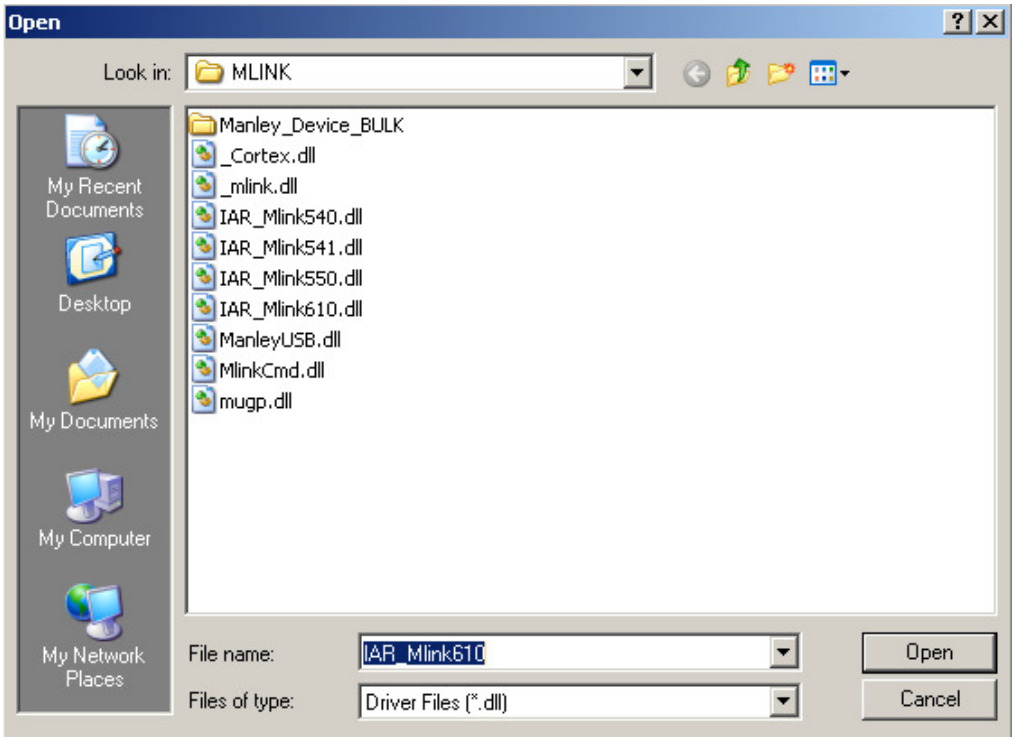

Figure 5-4-b

After completing all settings, select **Rebuild All** for the project,

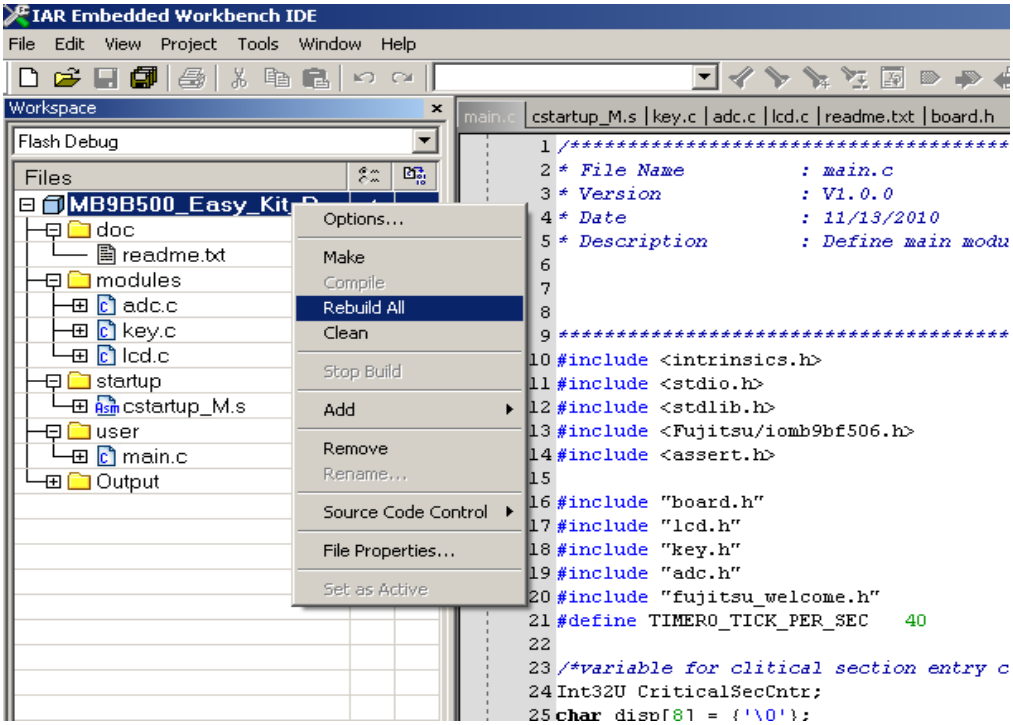

Figure 5-5

Click the **Download and Debug** icon shown below. The executable code is downloaded to Flash, operates to the main function and waits for the debug command.

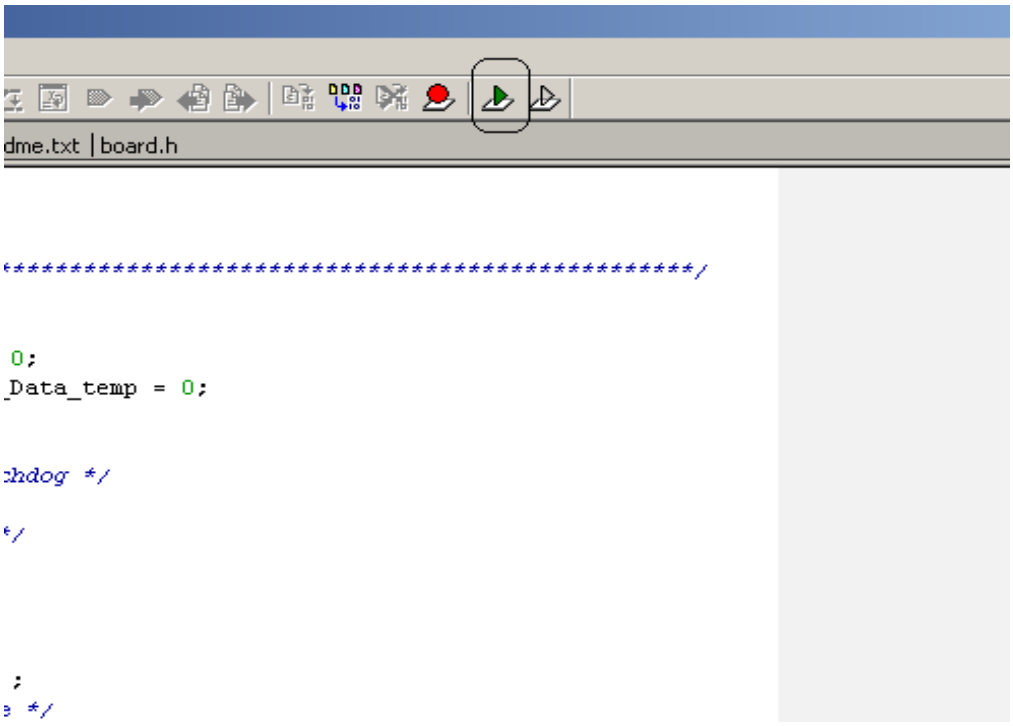

Figure 5-6

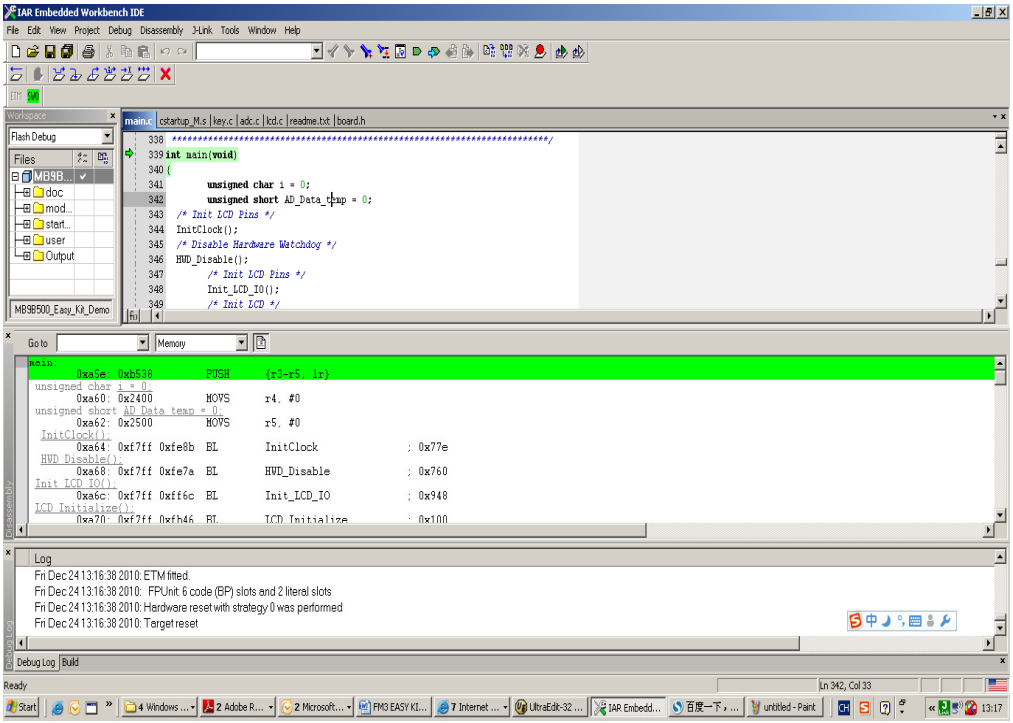
IAR Embedded Workbench IDE
File Edit View Project Debug Disassembly J-Link Tools Window Help
main.c | cstartup_M.s | key.c | adc.c | lcd.c | readme.txt | board.h
Flash Debug
Files
MB9B...
doc
mod...
start...
user
Output
MB9B500_Easy_Kit_Demo
338 **/
339 int main(void)
340 {
341 unsigned char i = 0;
342 unsigned short AD_Data_temp = 0;
343 /* Init LCD Pins */
344 InitClock();
345 /* Disable Hardware Watchdog */
346 HWD_Disable();
347 /* Init LCD Pins */
348 Init_LCD_IO();
349 /* Init LCD */
Go to
Memory
main:
0xa5e: 0xb538 PUSH {r3-r5, lr}
unsigned char i = 0;
0xa60: 0x2400 MOVS r4, #0
unsigned short AD_Data_temp = 0;
0xa62: 0x2500 MOVS r5, #0
InitClock();
0xa64: 0xf7ff 0xfe8b BL InitClock ; 0x77e
HWD_Disable();
0xa68: 0xf7ff 0xfe7a BL HWD_Disable ; 0x760
Init_LCD_IO();
0xa6c: 0xf7ff 0xff6c BL Init_LCD_IO ; 0x948
LCD_Initialize();
0xa70: 0xf7ff 0xfb46 BL LCD_Initialize ; 0x100
Log
Fri Dec 24 13:16:38 2010: ETM fitted.
Fri Dec 24 13:16:38 2010: FPUnit: 6 code (BP) slots and 2 literal slots
Fri Dec 24 13:16:38 2010: Hardware reset with strategy 0 was performed
Fri Dec 24 13:16:38 2010: Target reset
Debug Log Build
Ready
Ln 342, Col 33

Figure 5-7

6 How to Use the FSSDC-9B506-EK Easily

- Connect the PC via **CN1**. The red **LD2** indicates power is on and the green **LD1** means MLink is ready, otherwise it becomes flickering orange.
- Open **IAR EWARM** (Version V6.0 or above), load **MB9B500_Easy_Kit_Demo.eww** under directory of **MB9B500_Easy_Kit_Demo-v10** in the disc attached with the board.
- After confirming **MB9B500_Easy_Kit_Demo.ewp** is loaded, click **debug** and download code for debugging, LCD first displays voltage monitoring for 2 seconds and then changes to welcome to **Fujitsu**.
- Test the **LEDs** indicator set. The dimmer of **LED3 - LED5** could be controlled (**PWM** control).
- Test **Joystick**. **up**, **down**, **left**, **right**, **select** is displayed on the screen with each press of the button.
- Test **ADC**. Voltage measurement (**0mv - 3296mv**) is displayed while the potentiometer is tuned.